USER'S MANUAL

GENERATOR SETS

USER'S MANUAL

GESAN

RENTAL SERIES ELECTRICAL GENERATOR

GESAN

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1.- 1 WELCOME

Thank you for purchasing a GESAN electrical generator.

The purpose of this manual is to familiarize the user on how to use and work with the electrical generator, its components and maintenance.

We recommend carefully reading the manual prior to working with the equipment in order to ensure proper use.

Save this manual for future reference and if you ever decide to sell the electrical generator, be sure to include the manual along with the unit.

The following is a general description of the unit and the necessary information for installation, operation and preventive maintenance.

Additionally, you should have received a specific user manual for the engine and alternator, electrical setup and a set of keys.

Should you have any problem with the equipment provided, please contact the distributor directly.

GRUPOS ELECTRÓGENOS GESAN, S.A., as a part of its dedication to constant product improvement, will revise its manuals and incorporate the improvements made to supplied units. Thus the information contained in this document is subject to change without prior notice and without obligation to update.

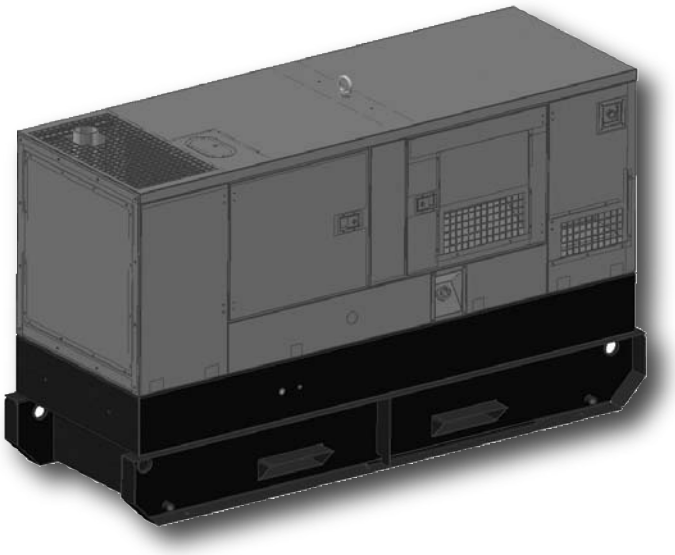
2.- BASIC SAFETY RULES

Safety precautions and recommendations for handling the electrical generator supplied by GESAN.

1) Do not allow the unit to be used by non-authorized personnel or by minors without adult supervision.
2) Use the necessary Individual protection equipment.
3) Ground the machine.
4) Make sure there is sufficient lighting on the control panel.
5) Do not install the open-skid electrical generator outdoors: risk of electrocution and inoperability.
6) The connection should be made by a qualified electrician in accordance with current norms and regulations. An improper connection can cause electrical feedback with electrocution hazards for anyone working with the mains power supply.
7) The supply line between the electrical generator and the consumers should be protected by means of a circuit breaker for protection against earth leakage (ELCB).
8) Do not operate the unit with the doors open. Risk of electrocution, burns or entrapment.
9) The exhaust system produces enough heat to ignite certain materials.
10) Do not inhale exhaust gases produced by the unit.
11) Do not touch the engine nor the exhaust while the electrical generator is operating as this could produce severe burns.
12) Ensure proper ventilation in the area where the generator is installed in order to guarantee sufficient flow of coolant air.
13) Do not refuel while the engine is running or in poorly ventilated areas.
14) Know how to stop the unit in case of emergency.
15) The fuel used is flammable and volatile.
16) Do not overfill the tank and make sure it is closed properly after filling. Use extreme precaution if fuel is spilled: the vapors and the fuel itself are flammable. Clean the area completely before starting up the unit.
17) Do not smoke or bring any flames or sparks in the vicinity of the electrical generator: risk of explosion.
18) If you notice abnormal behavior by the electrical generator, stop the unit and locate, examine and resolve the potential failure of the unit prior to restarting.
19) Keep the unit at least one meter away from buildings or other units.
20) Be cautious when switching or installing batteries as they contain acids which are highly hazardous. Avoid spills and use protection to avoid contact with the skin and eyes. In case of contact, rinse thoroughly with water and contact a doctor immediately.
21) In case of ingestion of battery acid, drink large amounts of water and milk and contact a doctor immediately.
22) Use only distilled water in the battery: tap water reduces its life cycle.
23) If a battery is filled above the maximum level, the electrolytes will spill out; if this happens, clean the area quickly to avoid corrosion of the parts it has come in contact with.
24) Frequently clean the unit to avoid obstructions or the entry of foreign elements into the unit (dust, moisture, etc.).
25) Regularly inspect the unit's electrical cords.
26) Prolonged contact with the used oil can cause skin cancer. Wash your hands after working with the generator.
27) Avoid oil spills on both the inside and outside of the generator. In case of an oil spill on the inside of the unit, clean it properly as it could potentially become a flammable material.

3.- INSTALLATION OF THE ELECTRICAL GENERATOR

General overview of the electrical generator and its different configurations manufactured by GRUPOS ELECTRÓGENOS GESAN, S.A.



Note: this image corresponds to the detailed view of Image 2

Image 1- ELECTRICAL GENERATOR WITH CANOPY AND OPTIONAL TRAILER FOR UNITS WITHOUT DRIP PAN.

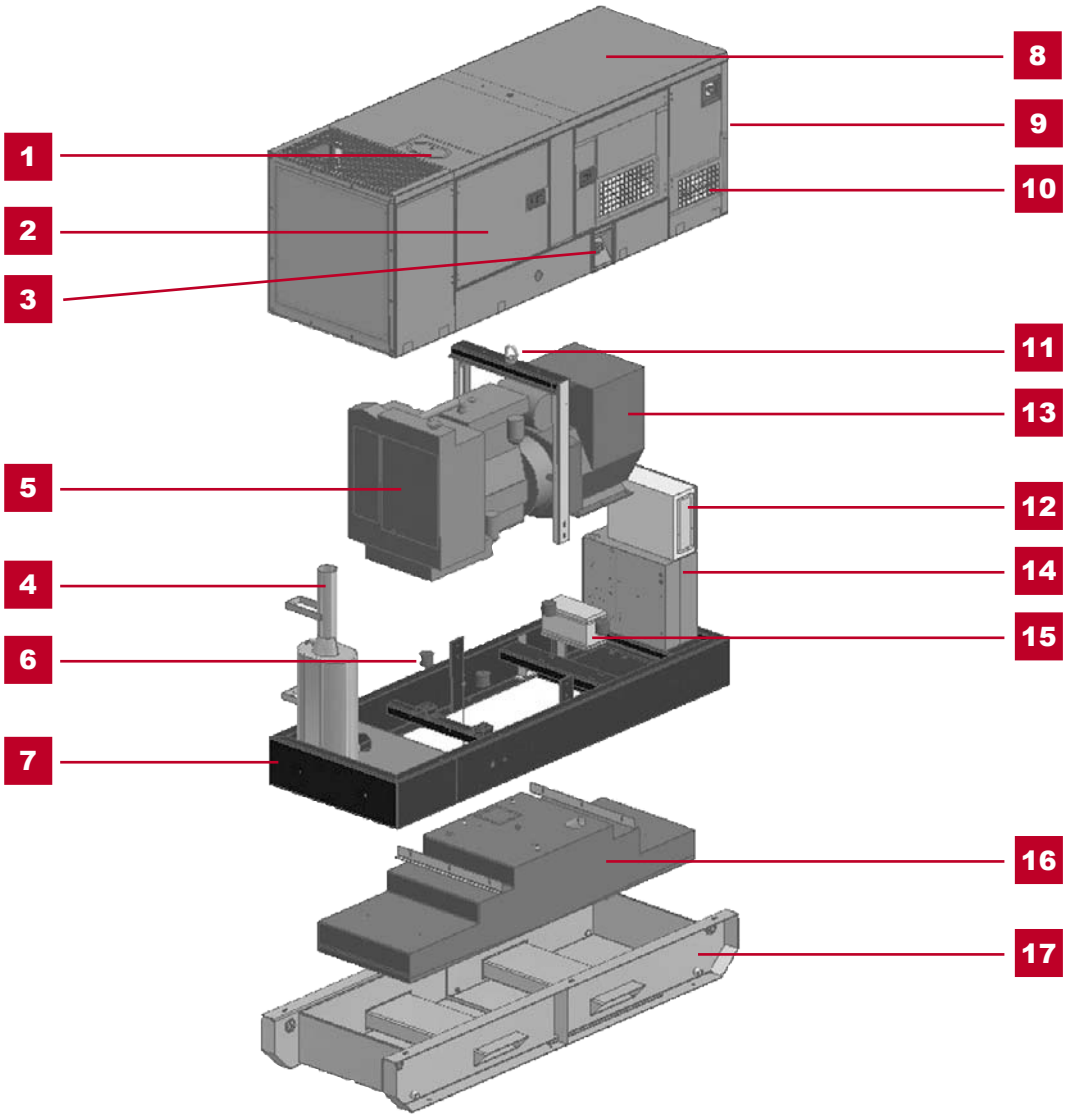


Image 2 - DETAILED VIEW OF IMAGE 1

1)	Coolant tank hatch
2)	Side access door
3)	Fuel tank cap
4)	Smoke exhaust
5)	Engine
6)	Antivibration feet
7)	Base frame
8)	Capot
9)	Electrical panel door
10)	Ventilation grill
11)	Lifting frame and eyebolt
12)	Electrical control panel
13)	Alternator
14)	Electrical power panel
15)	Battery
16)	Fuel tank
17)	Retention bath

3.1.- SOUND INSULATION

The supplied unit is soundproofed and includes sound-insulating canopy. See details on part 11

Image 3 - INTERIOR OF A SOUNDPROOFED ELECTRICAL GENERATOR

3.2 .- CONTROL UNITS

The unit provided may be controlled by different modules depending on the type of function it has been designed to perform.

The following is a generic control panel, which contains all of the electrical and mechanical options available.

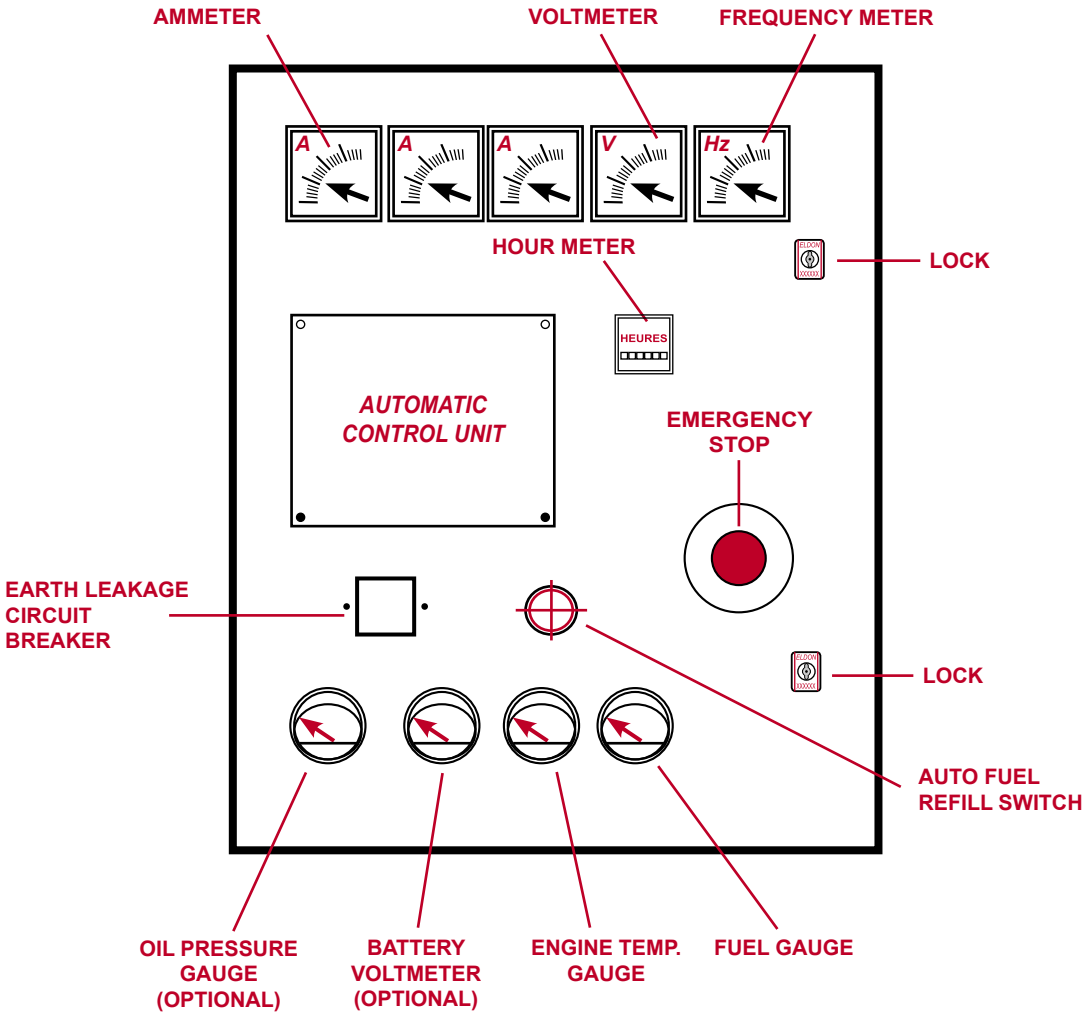


Image 4 - GENERIC CONTROL PANEL

3.2.1.- GPM-2 analog control module

If you purchased a generator unit with a GPM-2 control module, the electrical panel will look like the following diagram:

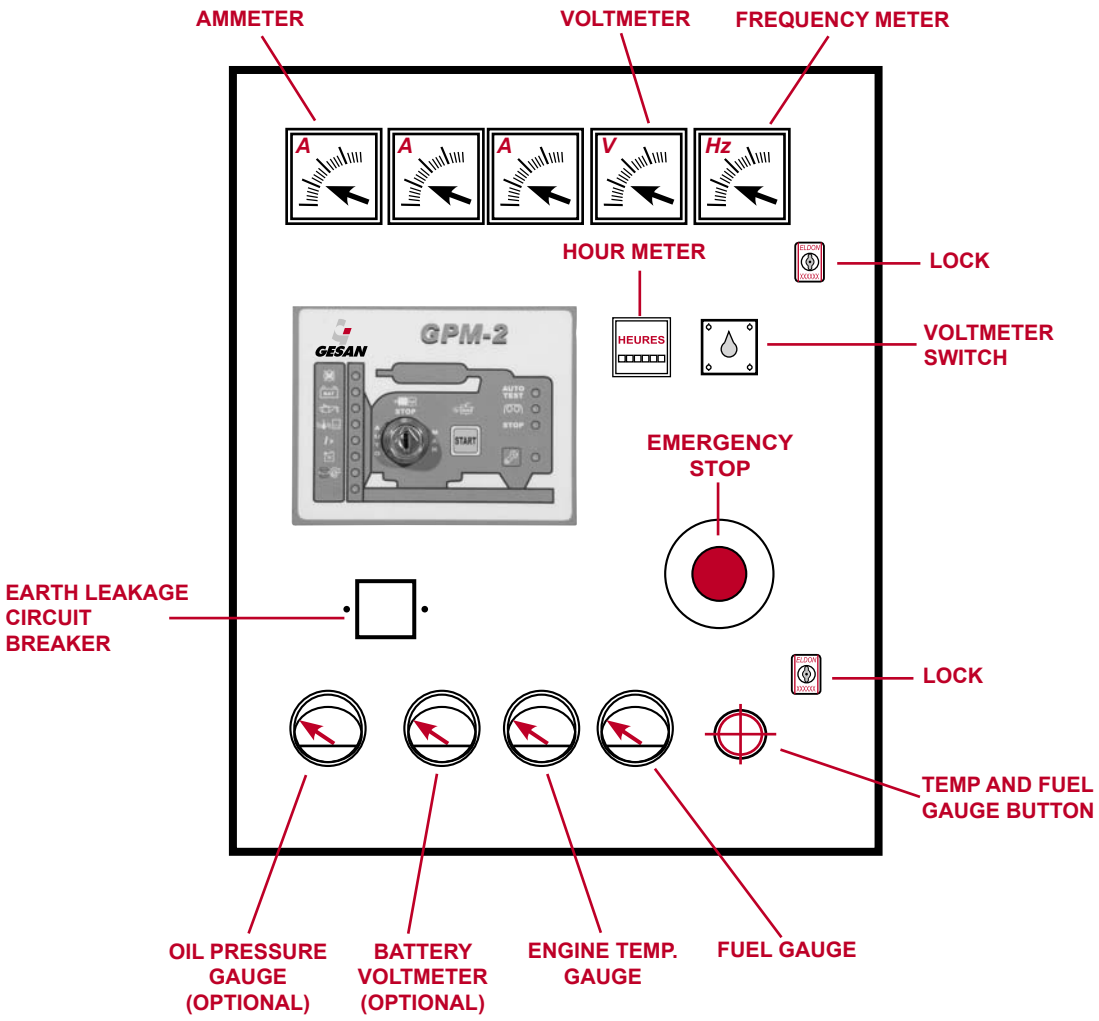


Image 5 - CONTROL PANEL FOR THE GPM-2 CONTROL MODULE

3.2.2.- DEEP SEA digital control module

If you purchased a generator unit with a DEEP SEA control module (models 5210 and 5310), the electrical panel will look like the following diagram:

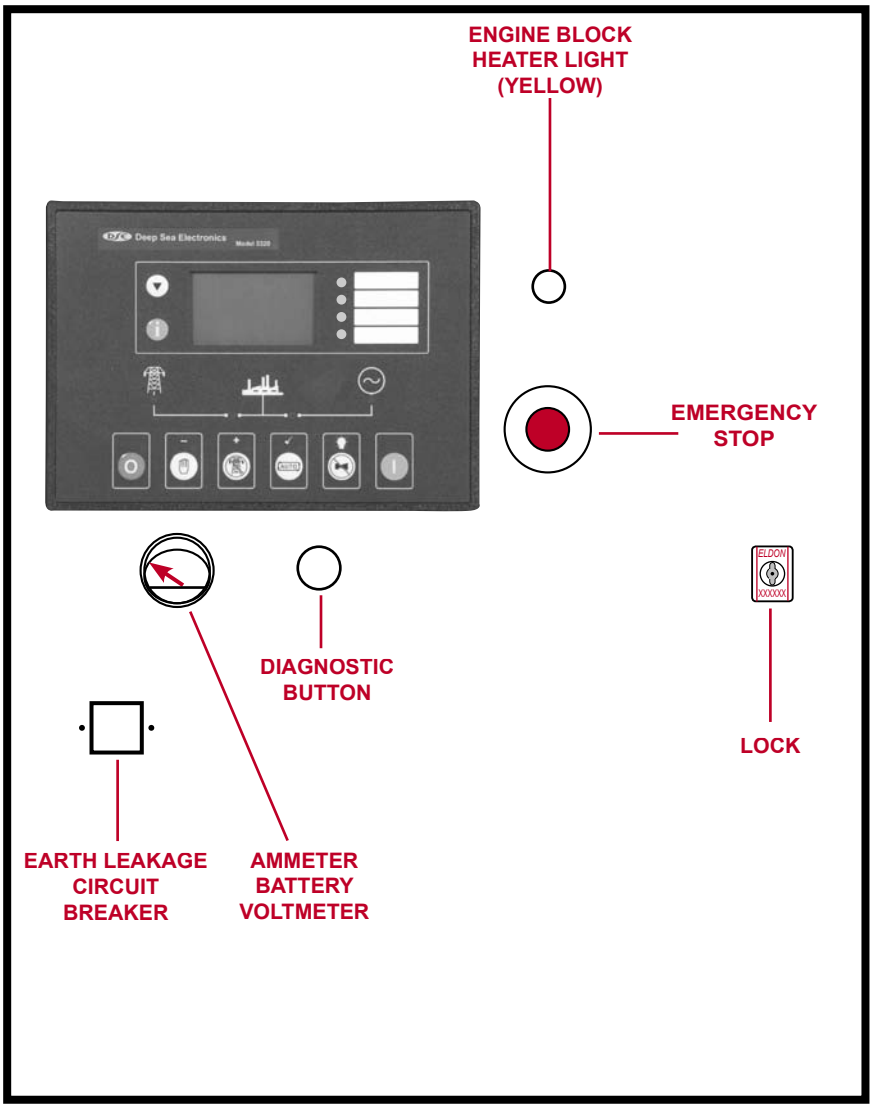


Image 6 - CONTROL PANEL FOR THE DEEP SEA CONTROL MODULE

Note: The *button on the control module performs the same function as the diagnostic button (while in OFF/AUTO mode).*

3.2.3.- INTELIGEN Digital Control Module

If you purchased a generator unit with an INTELIGEN control module, the electrical panel will look like the following diagram:

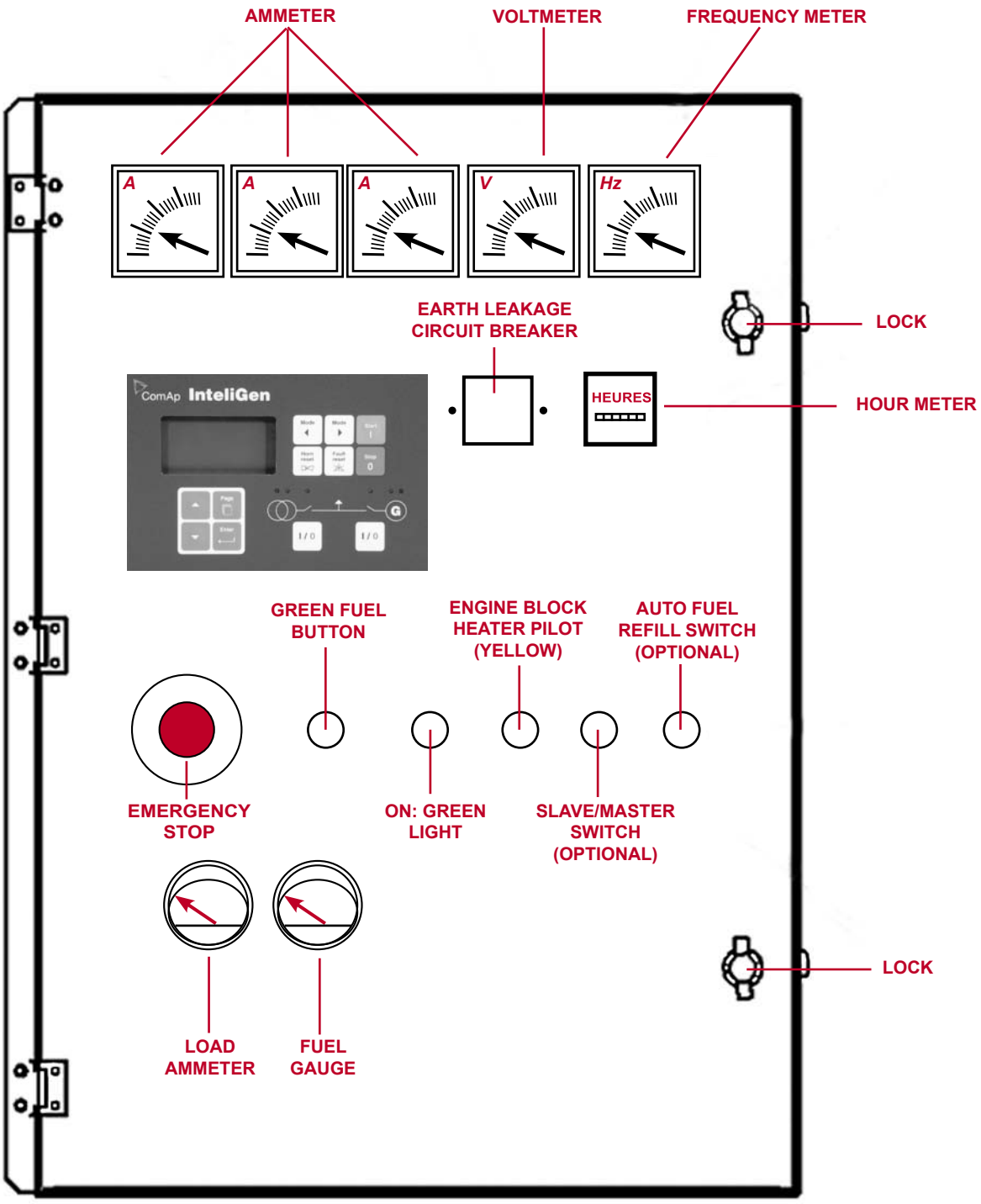


Image 7 - CONTROL PANEL FOR THE INTELIGEN CONTROL MODULE

3.3 .- TRAILER

The generator can be supplied with a trailer for transporting the unit.

- Site Trailer: for private-use areas only. Includes DIN hitch ring, safety brake and jockey wheel.

** Note: Ask about the possibility of using trailer with drip pan.*

Image 8 - TRAILER

4.- INSTALLATION OF THE ELECTRICAL GENERATOR

4.1 .- UNLOADING AND TRANSPORT

The unloading and transport of the unit should only be done by qualified personnel, observing certain minimum safety conditions.

- The ground must be capable of supporting the full weight of the Generator and the forklift.
- Make sure that the battery is disconnected.
- Make sure that the fuel tank is empty.
- Place the open arms of the forklift below the chassis at an equal distance with respect to the lifting frame.
- With a hoist, raise the unit using the lifting frame eyebolt.

The image below shows a generator unit that which includes a frame with a single lifting point.

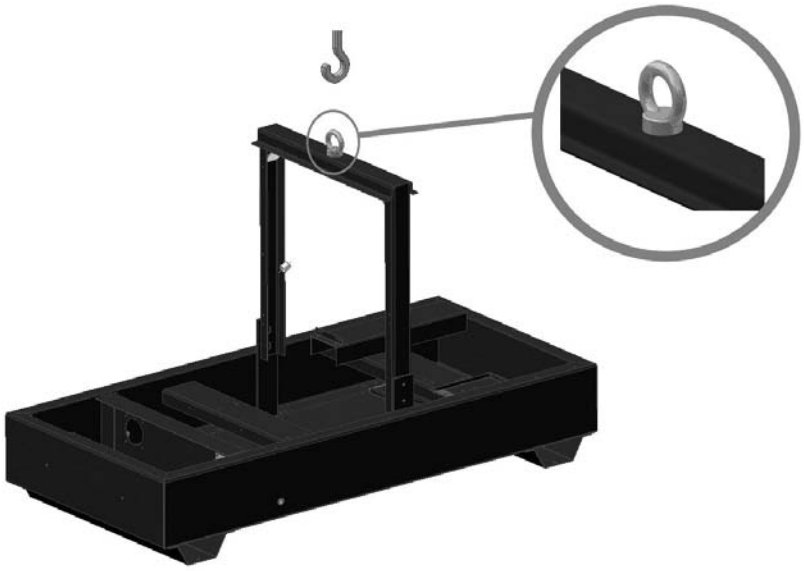


Image 9 - LIFTING FRAME

If your unit includes a trailer, one of the following may apply:

• **Trailer 1 - Site trailer:** Connected with a DIN hitch ring and safety chains to the rear of the towing vehicle. Use of this trailer is not authorized on public roads. Use the safety brake whenever necessary.

• **Trailer 2 - Road trailer:** Keep in mind the legal considerations detailed in point 3.3.

Always perform the following precautionary steps:

• Make sure the hitch ring and coupling connecting the towing vehicle to the trailer have the adequate towing capacity supporting a weight equal to or greater than the gross trailer weight.

• Make sure there is no wear or damage to the hitch system or coupling; never tow the generator if there is excessive wear or if any piece is damaged.

• Make sure the coupling is properly fastened to the towing vehicle.

• Check the condition of the trailer's tires.

• Connect the safety cable to the bumper or rear part of the towing vehicle; never attach it to the generator unit or to the hitch ring itself.

• Check to make sure the brake systems on both the trailer and towing vehicle are in perfect condition.

• Make sure the trailer's turn signal indicators and brake lights are correctly installed and functioning properly.

• After each transport, apply a light coat of grease to both the towing vehicle's coupling and the trailer's hitch ring. before towing again.

• Install safety chains on units with site trailer.

4.2 .- INSTALLATION OF PORTABLE UNITS

Portable units are defined as those moved to different work sites at least twice yearly.

4.2.1.- Placement

This type of unit must be installed in well ventilated areas in order to ensure sufficient flow of coolant air and preventing combustion smoke from sitting in the engine's exhaust.

The unit must be placed in a location that can safely bear the full weight of the generator unit and guarantee its stability both horizontally and vertically.

It should always remain at a distance that allows access to the interior of the electrical generator (at least 1 meter away from any building or wall).

Avoid installing in areas with moisture or locations where water could get into the interior of the unit.

* *Note: Exhaust can be supplied with optional spark arrester in the exhaust tube for Ex zones.*

4.2.2.- Fuel

As diesel fuel is used, keep in mind the safety instructions previously mentioned in point 2 - BASIC SAFETY RULES.

Before operating, check the fuel level to ensure that the tank has the amount needed by the generator unit for an entire work day.

There is a optional of quick conectors for external fuel tank. We can connect them with conductors through canopy fuel point for replenishing the generator base tank.

You should consider this series of points:

1) In order to connect or disconnect, you should move backwards the female lock fitting.
2) Make sure that the external tank aspiration circuit does not contain air.
3) In the external tank, the aspiration connector should be male and the return connector female, both are 3/8 BSP connectors.
4) Return should be correctly connected.
5) Connectors have to be watertight; they lock when they are disconnected.
6) The distance between tank and genset has to be as shorter as possible. If you observe engine anomalous behaviour (lack of power for aspiration problems), you should have to reduce distance or increase the hose diameter.

4.2.3.- Prior to starting generator

Before starting up the generator, inspect the consumer power supply conductors to make sure they are in perfect condition and that the consumers are disconnected; the unit should always be started up at no load.

Make sure that there is nothing obstructing the ventilation ducts and that there are no foreign objects inside the unit.

Make sure the fluid levels of the electrical generator are adequate for the service the unit will be providing and that there are no leaks or spillage.

4.2.4.- Electrical connection

The connecting of cables that supply consumers must be performed by qualified personnel; these conductors should be connected to terminals U V W and N or L1 L2 L3 and N or to the socket panels.

The four-pole circuit breakers have copper bus bars to facilitate the connection with conductors and prevent deterioration produced by repeated connecting.

Depending on the options selected, sockets may or may not have individual protection, which is distinguished from the general unit protection by the use of an individual circuit breaker for each socket.

4.3.- STORAGE

If you think your generator will be inactive for a long period of time, follow these instructions:

1) Press STOP on the control module.
2) Press the emergency stop button to avoid future involuntary startups when connecting.
3) Empty the fuel tank. Make sure the internal protection valve is in the correct position.
4) Leave the battery disconnected.
5) Avoid storing the unit in areas with high dust accumulation or excessive moisture.
6) Do not use pressurized water when cleaning the unit.
7) Check your engine manual for care instructions; the manual has been provided along with this booklet.
8) For alternator care instructions, please check your alternator's manual, which has been provided along with the document you are now reading.

5.- STARTING AND STOPPING THE UNIT

To start up the electrical generator, follow the steps listed below:

1) Check the levels of oil, coolant and fuel.
2) Close the battery isolator.
3) Release the emergency shutoff switch if it has been pressed.
4) Check the electrical generator's automatic switch (levers should be in the lowered position).
5) To perform the startup of your electrical generator, please refer to point 6 - OPERATION MANUAL, taking into account the control panel model of your unit.
6) Once the unit has been started, connect the electrical generator's automatic switch.
7) Make sure the earth leakage circuit breaker (ELCB) is functioning properly by pressing the TEST button.
8) Turn on the electromagnetic circuit breaker once again and use the electrical generator normally.

To stop the unit:

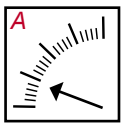
1) Disconnect the loads.
2) Turn off the electromagnetic circuit breaker.
3) Leave the engine running at no load for 2 minutes to cool down the generator unit.
4) Stop the engine completely by switching the control module switch to the OFF position.

6.- OPERATION MANUAL

The generator you purchased has been designed for manual service and thus starting and stopping the unit will be done manually.

The following is a description of the different elements, according to the electrical generator chosen.

6.1.- ELECTRICAL PANEL COMPONENTS



AMMETER:

Measures the Intensity (A), by means of a switch, of the different phases of the electrical generator.

FREQUENCY METER:

Indicates the Frequency of the electrical generator (Hz).

VOLTMETER WITH ATS:

Indicates the Voltage (V), by means of a switch, of the different phases of the electrical generator.

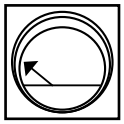
HOUR METER:

ndicates number of hours worked by the electrical generator.
The two digits in red on the right indicate hundredths of hours. Hours are indicated in white from the third digit on.

EMERGENCY STOP BUTTON:

Pressing this button brings the electrical generator to an immediate stop. To cancel, turn to the left, when the end of the emergency situation has been confirmed.

On soundproofed units the emergency stop button is installed apart from the electrical panel (built into the canopy).



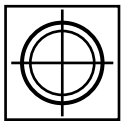
GAUGES INDICATING ENGINE PARAMETERS:

Oil pressure.

Intensity of battery voltage.

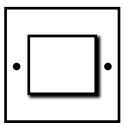
Engine temperature.

Fuel level.



DIAGNOSTIC BUTTON:

Allows engine parameters to be checked when electrical generator is stopped (electronically controlled engines). Also gives a readout of the generator's different alarms.



EARTH LEAKAGE CIRCUIT BREAKER (ELCB):

Protection against earth leakage of one phase, setting off the electrical generator's primary protection switch.

Configured to be activated when voltage is exceeded by 3 mA, with a time delay of 0s.

Includes a TEST button for checking the state of the ELCB.

It is the installer's responsibility to adjust and seal the ELCB according to the current regulations.

6.2.- GPM-2 ANALOG CONTROL MODULE

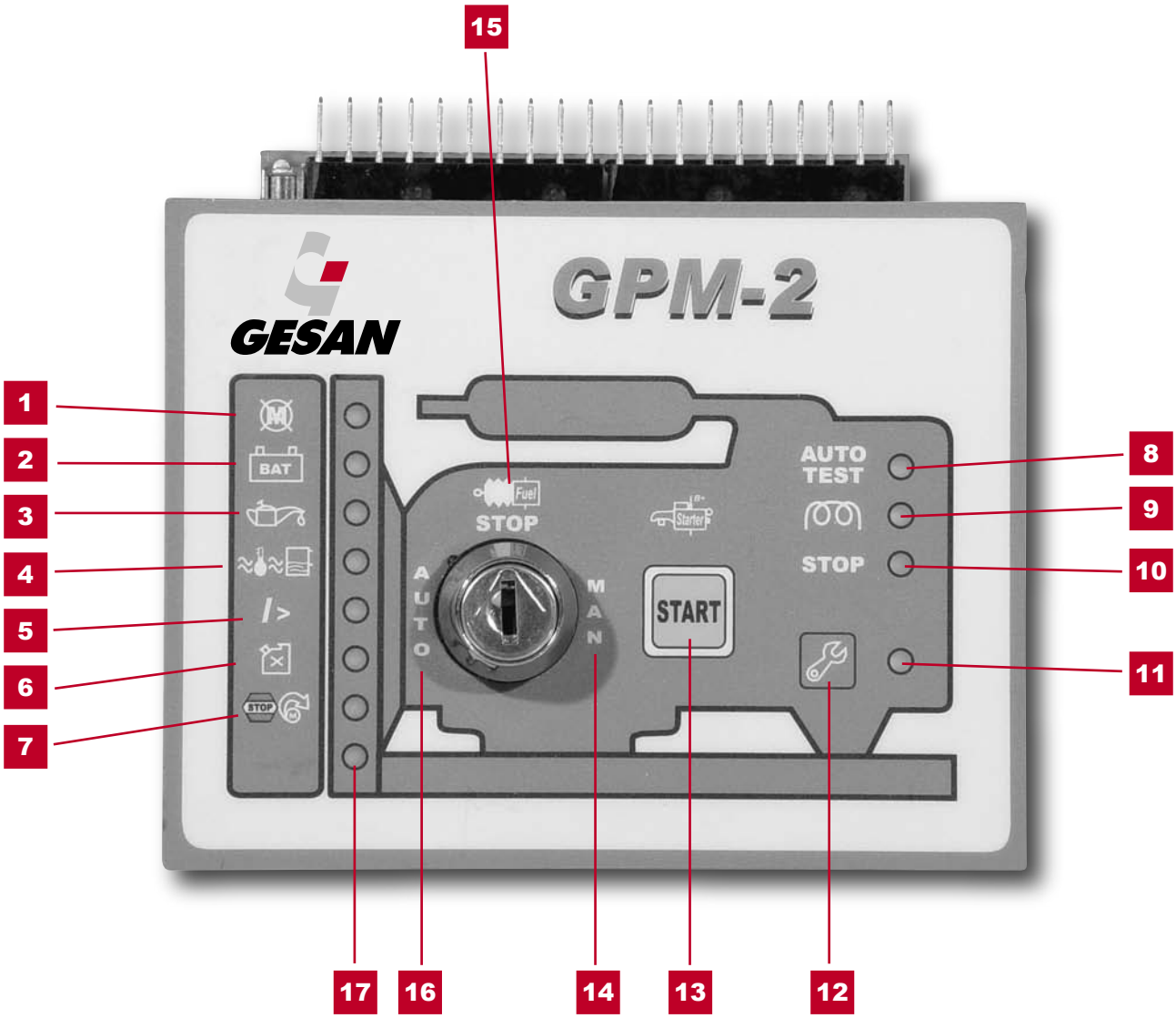
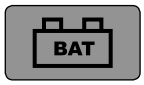
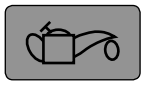
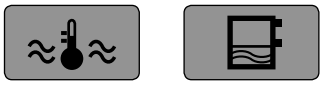
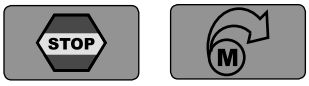
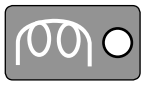
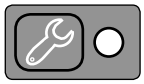
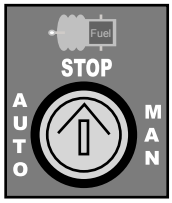
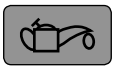


Image 10 - GPM-2 CONTROL MODULE

NUMBER	SYMBOL	DESCRIPTION	IDENTIFICATION
1		Unit startup failure / alternator failure.	Flashing red light: three failed startup attempts. Continuous red light: voltage failure or low frequency.
2		Battery charge alternator failure.	Flashing red light: battery charge alternator failure . Continuous red light (unit stopped): indicates contact.
3		Low oil level.	Flashing red light: low oil level. Continuous red light (unit stopped): indicates contact.
4		Low level / high coolant temperature.	Flashing red light: high temperature. Continuous red light: low coolant level.
5		Overload.	Flashing red light: unit overload.
6		Low fuel level.	Red: low fuel level. (Continuous/flashing red light: stopped/warning).
7		Emergency stop / overspeed.	Flashing red light: emergency stop. Continuous red light: engine overspeed.
8		Remote startup mode.	Green LED.
9		Unit heating.	Yellow LED.
10		Stop signal.	Flashing red light: imminent stoppage. Continuous red light: stop command.
11		Maintenance signal.	Flashing blue: see maintenance section.
12		Maintenance reset button.	Button.
13		Unit startup button.	Button.
14		Manual mode.	MAN
15		Key position for stopping unit.	STOP
16		Automatic mode.	AUTO
17		Programmable alarm.	Flashing or continuous red light; user-defined.

The GPM-2 control module has three positions: STOP, automatic (AUTO) and manual (MAN). Key selectable (numbers 14 through 16 of the descriptive chart for the control module).

- **Startup:**

When the key is turned to Manual Mode position, LED indicators for low oil level  (3), battery charge alternator

(2)), and preheating (9) will be turned on and after 10 seconds the LED indicator (9) will be turned off, at which point the START button

(13) can be pressed to start up the unit.

Follow the instructions detailed in point 5 - STARTING AND STOPPING THE UNIT.

Note: While the key is in the MAN position, if the button (13) is not pressed within 20 seconds the control module will shut down the system.

- **Stopping the unit:**

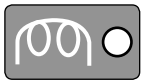
Follow the instructions detailed in point 5 - STARTING AND STOPPING THE UNIT.

Turn the key to the central STOP position.

INDICATOR LIGHTS:

8

Indicates remote startup; continuous green light turns on when unit is operating remotely.

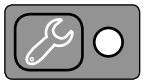


9

Indicates heating of the unit; continuous yellow light turns on when unit is being heated. Wait before starting up the unit.

10

Indicates stop signal.
Flashing: Indicates engine cooling period.
Continuous: The control module issues a stop command to the engine; stays lit for 20 seconds following the complete stopping of the engine.

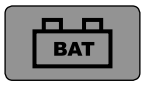
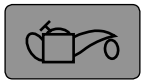
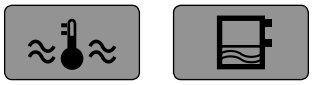
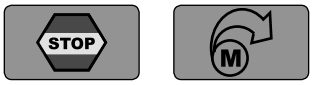


11

Indicates maintenance; flashing light; the first time the light turns on after 50 operating hours and afterwards every 150 hours.
To reset the maintenance hour meter, the electrical generator must be running. Turn the key to the STOP position while pressing the button (12) until the control module becomes completely deactivated.

ALARMS:

The following is a chart describing the possible alarms of the GPM-2 module:

NUMBER	SYMBOL	DESCRIPTION	IDENTIFICATION
1		Unit startup failure.	If the light is flashing, an audible signal will be given and generator is shut down.
		Alternator failure.	If light is continuous, indicates low frequency. If it runs below nominal level for over 30 seconds, unit is shut down.
2		Contact.	If light is continuous and the engine is stopped, indicates “contact” (not an alarm).
		Battery charge alternator failure.	If light is flashing, indicates failure and the control module issues unit stop command.
3		Contact.	If light is continuous and the engine is stopped, indicates “contact” (not an alarm).
		Low oil pressure.	If light is flashing, indicates failure and the control module issues unit stop command.
4		Low level.	If light is continuous, indicates low coolant level and module issues unit stop command.
		High coolant temperature.	If light is flashing, indicates high coolant temperature and the control module issues unit stop command.
5		Overload.	Light will flash and indicate that the protection switch is open; module issues unit stop command.
6		Low fuel level.	If light is flashing, indicates WARNING.
			If light is flashing, module issues unit stop command.
7		Emergency stop.	If light is continuous, module issues unit stop command, indicating an emergency stop (emergency button activated).
		Overspeed.	If the light is flashing, module issues unit stop command, indicating engine high speed.
17		Programmable alarm.	If the light is continuous, indicates WARNING.
			If light is flashing, module issues unit stop command.

Note: If at any point 3 or more LED indicators turn on, it could indicate low battery level.

6.3.- DEEP SEA 5210 DIGITAL CONTROL MODULE

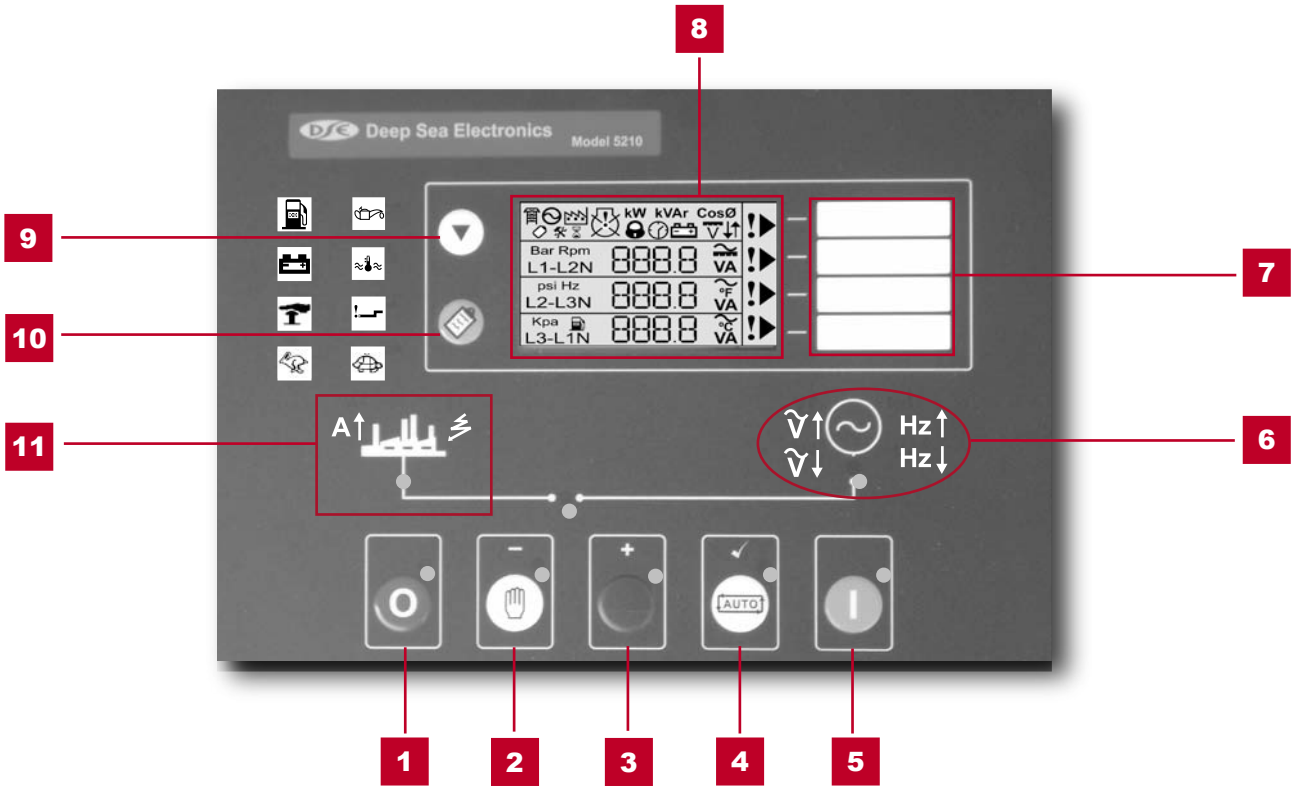


Image 11 - DEEP SEA 5210 CONTROL MODULE

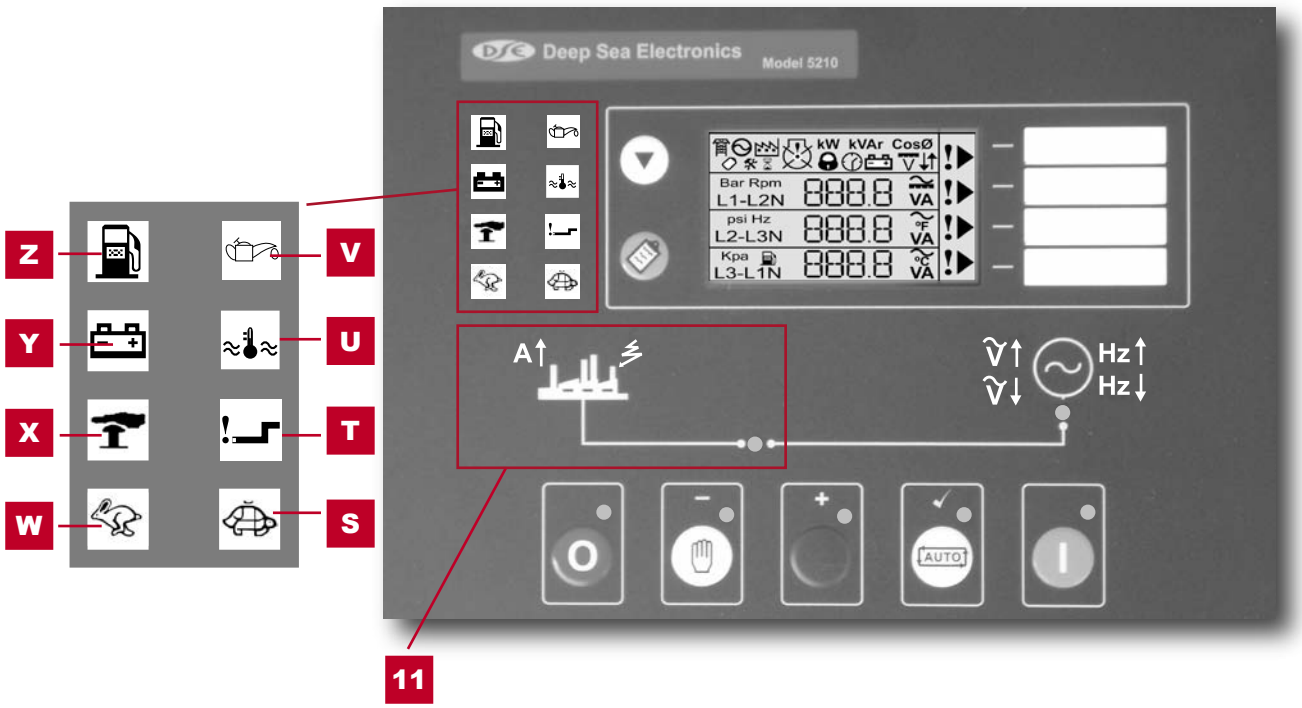
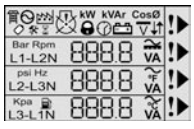


Image 12 - DEEP SEA 5210 CONTROL MODULE

NUMBER	SYMBOL	DESCRIPTION	IDENTIFICATION
1		Stop button. Control module connection.	Green LED
2		MANUAL mode button. Settings -	Green LED
3		Settings +	
4		AUTOMATIC mode button. Settings: ENTER.	Green LED
5		Startup button for Electrical generator.	
6		When lit, indicates correct readings for electrical generator.	Green LED
7		Configurable LED indicators.	
8		Screen indicating the status of the electrical generator.	
9		Down button on the screen menu.	
10		Event Log button.	
11		LED lit: Electrical generator is supplying consumers.	Green LED

- **Startup:**

If the LCD screen is off, press (1) to connect the control module and the LCD screen will turn on.

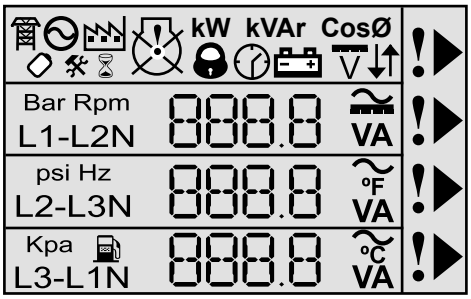
Press the button (2) and the LED in the top part of the button will turn on, indicating that the unit is operating. Press (5) briefly to start up the unit.

Follow the instructions detailed in point 5 - STARTING AND STOPPING THE UNIT.

There is a maximum of 3 startup attempts, after which the flashing stop symbol will be displayed along with the startup failure indicator .

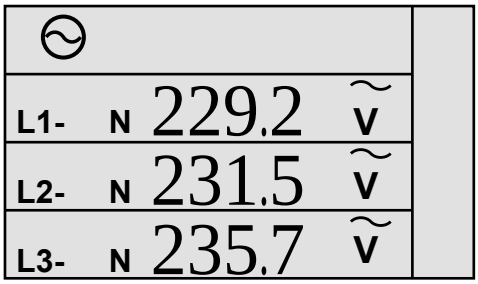
The status screen of the Deep Sea 5210 Control Module will indicate all of the possible events of the electrical generator.

This image shows all of the symbols displayed on the LCD screen (8).



The LCD display (8) will normally look similar to this:

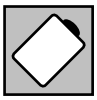
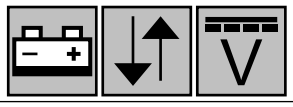
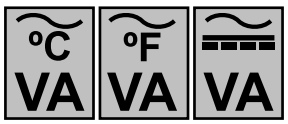
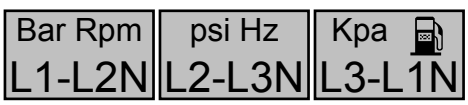
Example of the screen indicating the voltage readings for each phase of the electrical generator.



- **Stopping the unit:**

Follow the instructions detailed in point 5 - STARTING AND STOPPING THE UNIT.

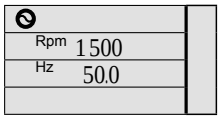
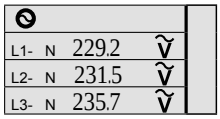
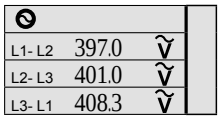
Press (1) to stop the unit. The unit will be stopped immediately.

ICON	DESCRIPTION
	Indicates that the screen display information refers to the electrical generator.
	Indicates that the event log reading is being accessed (Flashing).
	Indicates that the programming mode is being accessed.
	Indicates that the electrical generator is idle.
	Indicates that the electrical generator's system date and time is being shown.
	This icon indicates a stoppage or alarm; Warning = , Stoppage =
	Indicates the percentage of fuel remaining in the generator's tank.
	Indication related to the battery.
	Indicate battery level outside established limits.
	Indicates keypad is locked.
	kW and kVAr indicate units of current power. CosØ: Indicates power factor.
	º C: Measurement given in degrees celsius. º F: Measurement given in degrees Fahrenheit. ~ : Measurement related to alternating current. V : Measurement of voltage. A : Measurement of Intensity (amperes). ....: Indicates direct current.
	If Lx-Lx is displayed: Indicates measurement of phase-phase voltage. If Lx-N is displayed: Indicates measurement of phase-neutral voltage. Bar, rpm, PSI, Hz, kPa: indicate measurement units for the corresponding parameter. The lock icon indicates keypad is locked.

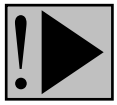
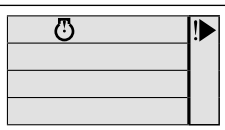
To view the different parameter readings, press , and the LCD indicator (8) will display these readings in the following order:

- RPM of generator / frequency (Hz).
- Line-Neutral AC voltage of generator.
- Line-Line AC voltage of generator.
- Oil pressure.
- Coolant temperature.
- Fuel level (%).
- Engine operating hours.
- DC voltage of battery.
- AC line current.
- Total kW.
- Voltage (V).
- Phase angle (cos).

The following is an example of what the LCD screen (8) will look like when the various parameters are displayed:

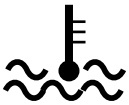
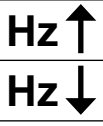
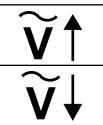
SCREEN SEQUENCE	DESCRIPTION
	Initial screen in which engine speed and generator frequency are measured. To measure the next parameter, press
	Then the second measurement screen appears, indicating the voltage readings between each phase and neutral. To measure the next parameter, press
	The third measurement screen will appear, indicating the voltage readings between phases. To measure the next parameter, press

Pressing afterwards, we move from one parameter to the next in the order specified on the previous page.

WARNING/STOPPAGE	DESCRIPTION
	Turns on to indicate a set alarm; displayed along with the icons detailed on the preceding page.
	Warning state = ; Stoppage =
	LCD screen will appear as follows when a configurable alarm is activated.

ALARMS:

The following chart describes each alarm:

NUMBER	SYMBOL	DESCRIPTION
Z		Fuel level below minimum.
Y		Low battery voltage.
X		Emergency stop.
W		Engine overspeed.
V		Low oil pressure.
U		High engine temperature.
T		If engine does not start after 3 attempts, the unit will be stopped and this icon will be displayed.
S		Low engine speed.
H		Alternator frequency beyond established limits.
V		Alternator voltage beyond established limits.
A		If it is detected that the generator's output current exceeds the established value for an extended period of time, this warning will be displayed. If the cutoff point for overcurrent is exceeded by 10% for one hour, the unit will be stopped.

Note: If the established limits defined as warning or stop are exceeded, the module will display the corresponding alarm. None of these will be shown if not detected by the system.

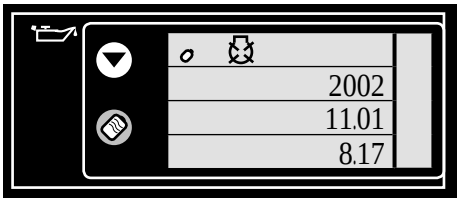
Note: The

ashing.

- Event log:

To view the event log, press the following button repeatedly (10).

This icon will flash .

A screen similar to this will be shown: 

"On november 1, 2002, at 08:17, the system detected that the oil pressure was below the minimum level and shut down the generator."

To move from one event to the next, press (9).

To exit the main screen, press (10).

Note: Warning alarms are not logged.

- Adjust date and time:

The date and time are adjustable. When the battery is disconnected, the date and time are frozen; when the battery is reconnected, the date and time shown will be from the time the battery was disconnected.

The date and time reflected in the event Log will be taken from the configuration according to the following steps:

Press (1) and (10) simultaneously. This icon will flash, indicating that "configuration mode" is active. The calendar will be shown.

Press (4) and the hour will start flashing.

To adjust to the desired setting, press (3) or (2).

Once the desired value has been set, press (4) to save.

LIST OF POSSIBLE ALARMS:

1	Low pressure
2	High temperature
3	Fuel level (%)
4	Date / time
5	Mains transient delay
6	Start delay
7	Warming up
8	Crank attempt
9	Crank rest
10	Safety delay
11	Overspeed overshoot
12	Warming up
13	Transfer delay
14	Return delay
15	Cooling run

16	Energize to stop
17	Low voltage
18	High voltage
19	Low frequency
20	High frequency
21	Generator under voltage L1-N
22	Generator over voltage
23	Generator under frequency
24	Generator over frequency
25	Delayed overcurrent %
26	Under speed
27	Over speed
28	Low voltage
29	High voltage
30	Alternator failure

6.4.- DEEP SEA 5310 DIGITAL CONTROL MODULE

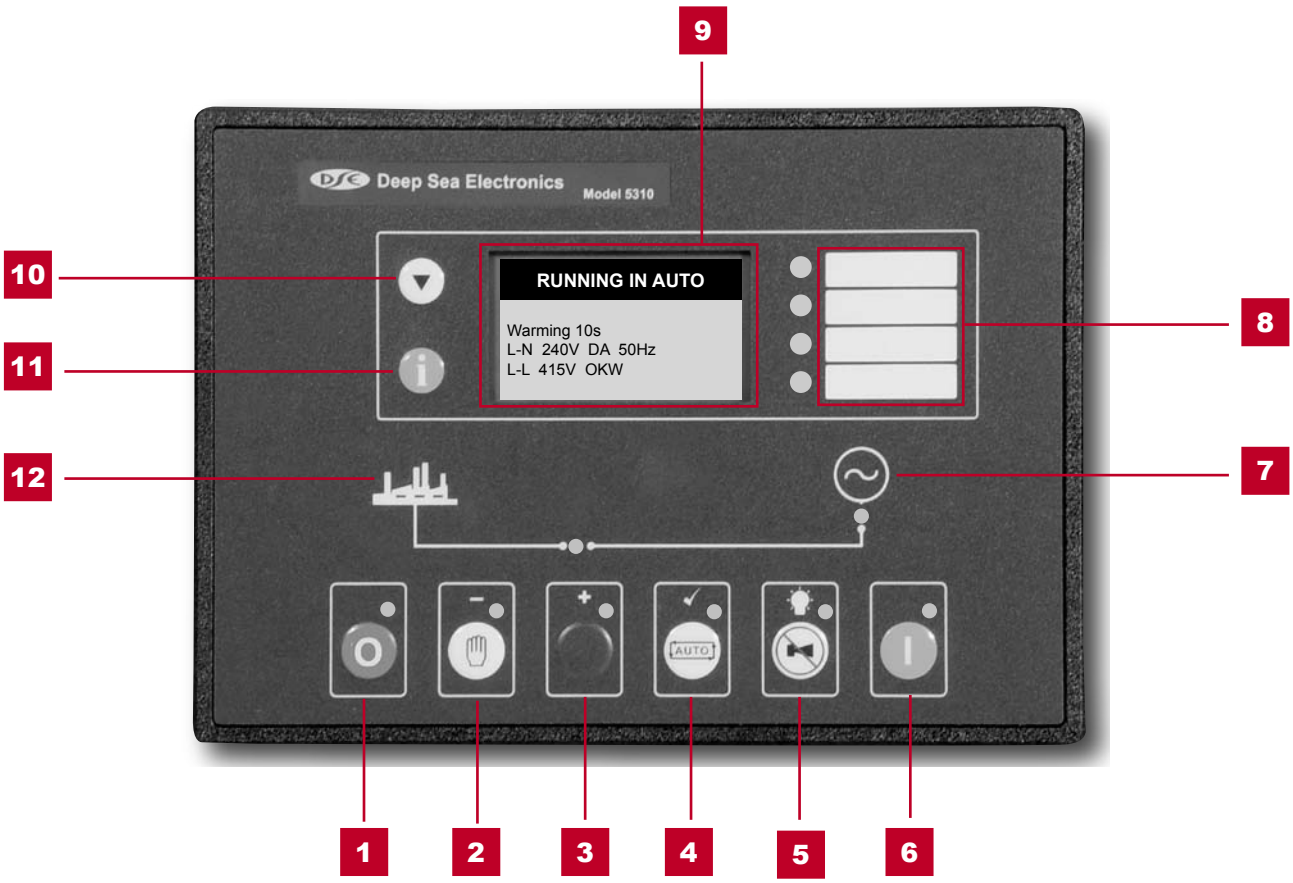
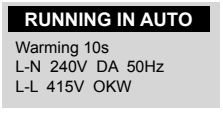


Image 13 - DEEP SEA 5310 CONTROL MODULE

NUMBER	SYMBOL	DESCRIPTION	IDENTIFICATION
1		Stop button.	Green LED
2		MANUAL mode button. Settings -	Green LED
3		Settings +	
4		AUTOMATIC mode button. Settings: ENTER.	Green LED
5		Button to silence alarms / control module LED test.	Green LED
6		Button for starting up electrical generator.	
7		When lit, indicates correct readings for electrical generator.	Green LED
8		Configurable LED indicators.	Red LED
9		Screen indicating the status of the electrical generator.	
10		Down button on the screen menu.	
11		Button to scroll to next page of screen menu.	
12		Electrical generator is supplying consumers.	LED

- **Startup:**

If the LCD screen is off, press (1)) to connect the control module and the LCD screen will turn on.

Press the button (2) and the LED in the top part of the button will turn on, indicating that the unit is operating.

Press (5) to start up the unit.

Follow the instructions detailed in point 5 - STARTING AND STOPPING THE UNIT.

There will be a maximum of 3 startup attempts, after which the information screen will display a startup alarm:

- **Stopping the unit:**

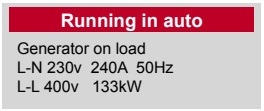
Follow the instructions detailed in point 5 - STARTING AND STOPPING THE UNIT.

Press (1) to stop the unit. The unit will be stopped immediately.

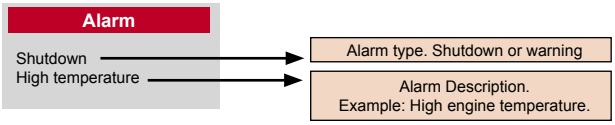
ALARMS:

Press (5) to silence the audible alarm and the common alarm LED.

By default, the information screen will display the following message:

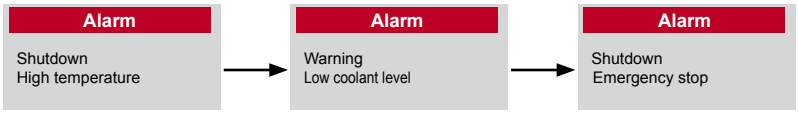


If an alarm occurs, the screen will display the following:



The warning alarms do not entail generator unit shutdown.

If shutdown occurs while a warning is active, the screen will cycle through the active alarms:



INCIDENT	ALARM DESCRIPTIONS
ALARM Warning Charge fail	Battery charge alternator voltage not detected.
ALARM **Warning** **Low battery volts** **ALARM** **Warning** **High battery volts**	Battery voltage beyond established limits.
ALARM **Fail to stop**	After shutdown command, engine continues running. Could also indicate faulty oil pressure sender.
ALARM **Warning** **Low fuel level**	Low fuel level.
ALARM **Warning** **Low oil pressure**	Low oil pressure.
ALARM **Warning** **High temperature** **ALARM** **Warning** **Low coolant temperature**	Engine temperature beyond established limits.
ALARM **Avertissement** **Overspeed** **ALARM** **Warning** **Underspeed**	Engine speed beyond established limits.
ALARM **Warning** **Over frequency** **ALARM** **Warning** **Under frequency**	Alternator frequency beyond established limits.
ALARM **Warning** **AC overvolts** **ALARM** **Warning** **AC undervolts**	Alternator voltage beyond established limits.
ALARM **Warning** **High current**	Intensity of the alternator output beyond established limits.

INCIDENT	DESCRIPTION OF SHUTDOWNS
ALARME **Shutdown** **Failed to start**	Engine does not start, three attempts made.
ALARME **Shutdown** **Emergency stop**	Controlled shutdown of the unit. It will not be functional until the emergency stop button has been reset.
ALARME **Shutdown** **Low oil pressure**	Low oil pressure.
ALARME **Shutdown** **High temperature**	High engine temperature.
ALARME **Shutdown** **Overspeed** **ALARME** **Shutdown** **Underspeed**	Engine speed beyond established limits.
ALARME **Shutdown** **Over frequency** **ALARME** **Shutdown** **Under frequency**	Alternator frequency beyond established limits.
ALARME **Shutdown** **AC overvolts** **ALARME** **Shutdown** **AC undervolts**	Alternator voltage beyond established limit.
ALARME **Shutdown** **Oil pressure sender fault**	Faulty oil pressure sender.
ALARME **Shutdown** **High current trip**	Intensity of the alternator output beyond established limits.
Note: If the established limit for shutdown is exceeded, a corresponding alarm screen will be displayed and on the configurable LED indicator (8) the common shutdown alarm will appear.	

- Typical information screen messages:

Running in auto
Generator on load L-N 230V 240A 50Hz L-L 440V 133kW

Indicates electrical generator running normally in automatic mode. Also indicates the average line to neutral voltage (L-N), the highest of the three phase currents, the nominal frequency, average line-to-line voltage (L-L) and total kilowatts.

- Measurement parameter display screens:

Coolant temperature
60 ºC 140 ºF

Coolant temperature in degrees (ºC) Celsius and degrees Fahrenheit (ºF).

Oil pressure
6 Bar 87 PSI 600 kPa

Displays engine oil pressure in Bar, PSI and kPa.

Generatos amps
L1 L2 L3 238 241 241

All three generator line currents.

- Event Log:

To view the event log, press the following button repeatedly (11).

Register of shutdown alarms occurring in the generator unit; the most recent occurrences can be stored. A screen similar to this is shown:

Event log 21:15:00
10 september 2003 Low oil pressure Shutdown

"On September 10, 2003, at 21:15, the system detected that the oil pressure was below the minimum level and shut down the generator".

To scroll from one event to the next, press (10).

To exit the main screen, press (11).

Note: Warning alarms are not logged.

- Displaying information:

Press this button: (11).

Page order:

- Status display.
- Instrument display.
- Alarms display.
- Event log.

It is possible to scroll through the different display screens by pressing the next page button: (10). Once selected, the instrument will remain on the screen until the user selects a different instrument or after a period of inactivity for the control module, at which point the default display appears.

Alternatively, by holding down on (10) the user can autoscroll through all of the instruments on a particular screen. To disable scrolling, stop pressing the page down button then either press it again for a few seconds or press (11). When autoscroll is disabled, if no buttons are pressed the display will return to the alarms page.

If an alarm becomes activated while viewing instruments, the alarms page will be automatically displayed.

Instrument page content:

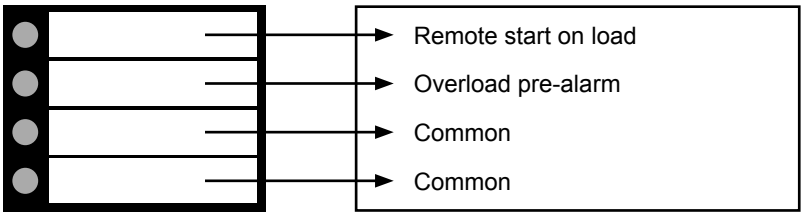
- Engine speed.
- Oil pressure.
- Coolant temperature.
- Engine hours run.
- Number of starts.
- DC battery voltage.
- Generator AC voltage L-N.
- Generator AC voltage L-L.
- Generator line current.
- Fuel level (%).
- Nominal voltage L-N.
- Nominal voltage L-L.
- Nominal frequency (Hz).

If the following appears in an instrument display: # # # # # # , this means that the engine cannot provide this parameter; the control module, however, can display this instrument.

If the following appears in an instrument display: # # # # # # with the electrical generator in OFF/AUTOMATIC mode (with the engine stopped), this means that the control module is not connected to the engine.

Press this button (6) to display the given value.

- **Alarm LED:**



- **Editing the current date and time:**

The date and time are adjustable. When the battery is disconnected, the date and time are frozen; when the battery is reconnected, the date and time shown will be from the time the battery was disconnected.

The date and time reflected in the event Log will be taken from the configuration according to the following stepst:

Press (1) and (11)) simultaneously, then enter the correct PIN number.

Press (3) until the date and time screen appears.

When Date and Time screen appears, press the button (4). The minutes will start to flash.

Press (3) or (2) to adjust to the desired setting.

Press the (10) button to confirm the value entered. The hour will begin to flash. Press (3) or (2) again to adjust to the desired setting.

Press the button (10) to confirm the value entered and select the day. The day will begin to flash.

Press (3) or (2) again to adjust to the desired setting.

Press the (10) button to confirm the selection made and select the month. The value will start to flash.

Press (3) or (2) again to adjust the month.

Lastly, set the correct year by pressing the (10) button. The year will start to flash. Press (3) or (2) pour régler la valeur désirée.

Press (4) to save the changes made to date and time.

The screen will display the date and time →

Date and time
19 sep 2003 10:00

entered.

6.5.- INTELIGEN DIGITAL CONTROL MODULE

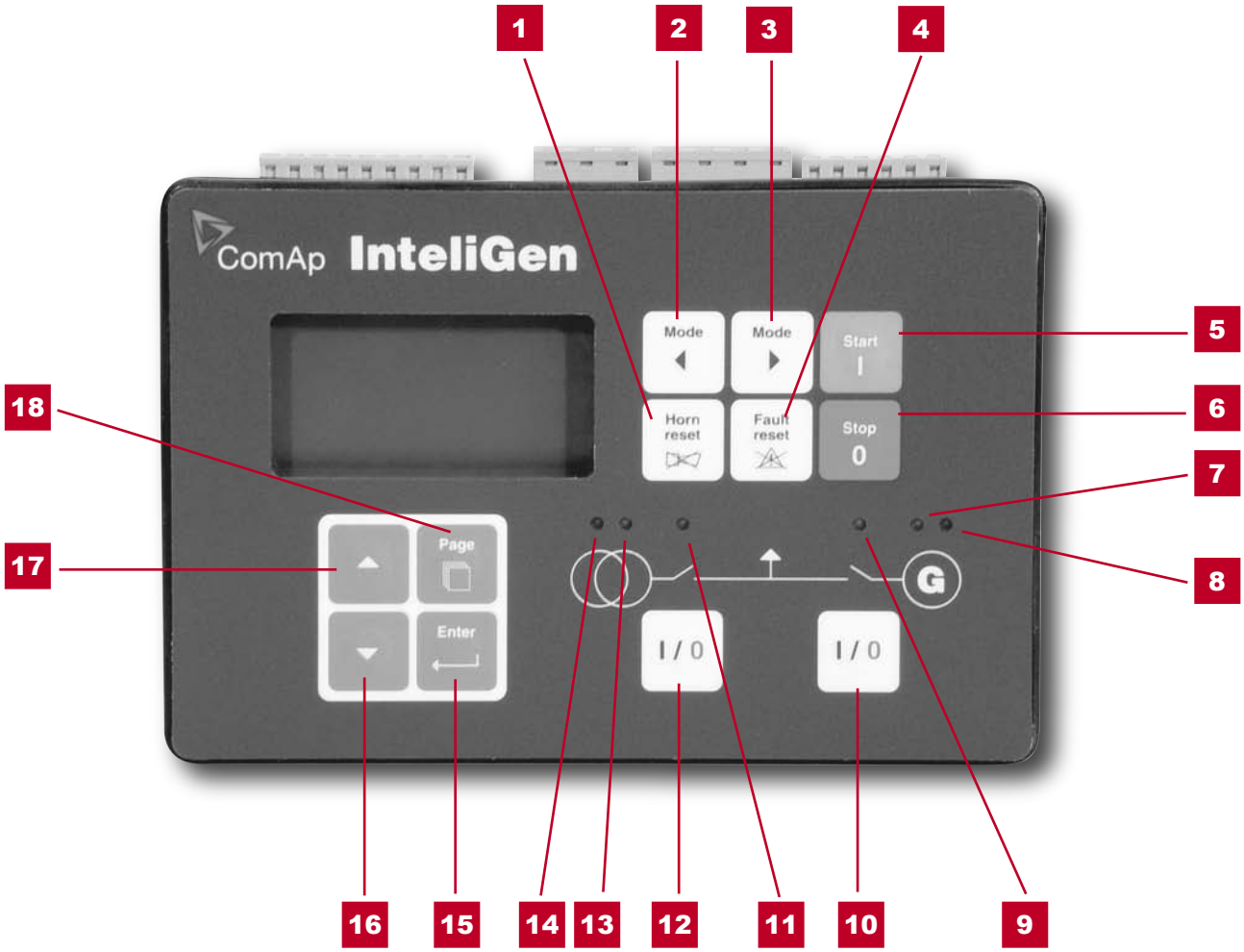
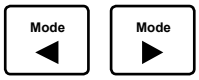
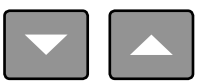


Image 14 - INTELIGEN CONTROL MODULE

NUMBER	SYMBOL	DESCRIPTION	IDENTIFICATION
1		Deactivates audible alarm.	
2		Scrolls through different operating modes.	OFF←MAN←AUT←TEST
3			OFF→MAN→AUT→TEST
4		Fault reset.	Acknowledges faults and alarms.
5		Start button.	In manual mode.
6		Stop button.	In manual mode.
7		Generator voltage present.	Green if unit voltage is present and within limits. Flashes during synchronization with mains.
8		Electrical generator failure.	Flashing Red LED indicates alarm.
9		State of GCB.	Green when GCB is closed. Flashes during synchronization with mains.
10		GCB on/off.	Opens and closes GCB in manual mode.
11		State of MCB.	Green is MCB is closed. Flashes during synchronization with mains.
12		MCB on/off.	
13		State of mains power.	Green if mains power is correct.
14		State of voltage supplied to consumers.	Red light flashes if mains failure occurs and generator stops; continuous if generator is operating, turns off when mains power restored.
15		Enter button.	Confirms on-screen value.
16		Selects on-screen value.	Increases value.
17			Increases value.
18		Button to cycle through the menus.	Cycles through display screens. →MEASUREMENT →ADJUSTEMENT →HISTORY

The **InteliGen** module contains the following three menu screens:

- Measurement
- Adjustment
- History

} Can be selected using the following button

(18).

To display the different instruments on each screen menu, press (17) and (16).

The measurement screen displays the parameters measured by the engine; if the engine uses an electronic management system, many additional parameters can be displayed. In addition to these parameters, measurements can be displayed for fuel level, oil pressure, current, voltage, frequency, run hours and battery charge level.

The adjustment menu screen displays the adjustment parameters already configured; it is not necessary to edit any of these.

The history screen menu displays the log of alarms that have occurred in the generator unit. It also logs the opening and closing of the mains circuit breaker as well as the starting and shutting down of the generator unit.

- **Startup:**

Press the START button

(5) to start up the electrical generator. When the generator voltage is within the established limits, the LED indicator (7) will be lit. Next press the GCB ON/OFF button

(10). The loads will be transferred directly to the electrical generator. To stop the unit, press STOP

(6).

- **LOAD TEST Mode (Manual):**

This operating mode is used to allow the electrical generator to check the state of the mains power or to disconnect from the mains when an imminent mains failure is detected. When this operating mode is selected, the unit starts up at no load. To transfer the loads to the unit, press the MCB ON/OFF button

(12), and then press the GCB ON/OFF button

(10). At this time synchronization occurs between the electrical generator and the mains for 60 seconds to assume the loads.

- **OFF mode:**

The electrical generator will not start. Even if we press the buttons START

(5), STOP (6), GCB ON/OFF (10), the generator will not respond.

7.- MAINTENANCE OF ELECTRICAL GENERATOR

You must make sure that the person who will perform this duty is qualified to do so and utilizes the appropriate individual protection equipment.

7.1.- PRIOR TO MAINTENANCE

You must first:

- Switch control module to the STOP position.
- Press the emergency stop button.
- Open the battery isolator.

7.2.- DURING MAINTENANCE

Preventive maintenance tasks are necessary to preserve the unit; doing so will result in optimum performance. Be sure to verify the following items:

1) While the engine is cold, the oil level should be between the minimum and maximum values. If it is below the minimum, add engine oil.

Note: With the GPM-2 and InteliGen modules, after running 50 hours notice will be given to change the oil. The recommende oil is 15W40.

2) radiator water level should be adequate.

3) The fuel level in the tank should be sufficient for the service to be performed. The generator control panel is equipped with a fuel gauge, which will be functional whenever the electrical panel is receiving power.

4) Always refuel in a well ventilated area with the engine stopped.

5) Closely inspect the connections and the electrical circuit, for both the mechanical and electrical sections.

6) Check carefully for possible liquid leaks. If a leak is detected, find its source and resolve the problem.

7) The air inlet and outlet vents should be completely unobstructed to allow for free circulation of cooling air.

8) Check the battery's connection terminals and electrolyte level (if necessary, add demineralized or distilled water). Acid should never be added. The battery should be recharged if the terminal voltage is below 12.3 V.

9) If the battery needs recharging after being taken out of the unit, remove the vent caps and charge battery with direct current only. Connect the charger's positive (+) cable to the battery's positive (+) terminal and the charger's negative (-) cable to the battery's negative (-) terminal. Recharge battery with a current equaling 1/10 the nominal capacity (Ah). Battery is fully charged when acid density is 1.28. Before completing recharging process: turn off charger before disconnecting battery and check electrolyte level.

10) If the battery is discharged and you want to perform an emergency startup with the battery from another generator, first check the tightness of the discharged battery's terminals. Stop the engines of both units and connect the two positive terminals of the batteries first and then connect the negative terminal of the charged battery to a metal area on the disabled unit (ground). Start up the auxiliary unit and then the unit being repaired. Disconnect the cables in reverse order to avoid a short circuit. Finally, fully charge the battery.

11) Installation of the fuel filter in all units means that the operator must constantly monitor the water buildup and drain as it becomes filled. This does not entail an inconvenience but rather simply keeping an eye on the transparent tank in order to know when to drain. If the filter were to become worn out, it should be replaced.

12) The oil draining pump improves the draining process, saves time and facilitates maintenance.

13) The fuel tank includes a drain hatch to provide quick access and a safety valve to prevent fuel from being extracted through the outlet on the base fra.

14) The radiator is drained through the base frame outlet.

15) For maintaining the canopy, we recommend cleaning periodically to avoid dirt buildup. The unit's galvanized canopy prevents corrosion and rust.

Note: While performing preventive maintenance tasks it is advisable to wear protective eyewear and gloves during all operations involving the handling of battery acid.

Note: Remember to always perform all operations with the utmost precaution and safety as indicated in this Manual. (Pay special attention to the risk of short circuits that could be caused by coming in contact with the unit's metallic objects).

7.3.- MAINTENANCE CHART

FREQUENCY	MAINTENANCE OPERATION
AFTER 50 HRS.	• Perform 250 hr. maintenance.
DAILY	• Check fuel level on the main tank. • Check coolant fluid level. • Check the oil level (see engine's user manual). • Drain water separator filter. • Make sure the radiator inlets and outlets are unobstructed. • Inspect the air filter service indicator. • Make sure the electrical generator's outlet cables are in perfect condition. • Make sure machine is properly grounded and that the earth leakage circuit breaker is working (press test button). • Perform a general inspection and make sure there are no fluid leaks. • Check the engine manufacturer's manual for specific tasks.
EVERY 50 HRS. / WEEKLY	• Water and sediment in fuel tank: Drain.
EVERY 250 HRS. EVERY 6 MONTHS	• Review the connections of the startup battery, clean and cover with vaseline. • Change the filtering element of the water separator filter. • Start up the engine 3 times, noting the voltage readings each time. Make sure battery voltage is correct on each startup. • Make sure all of the electrical panel lights are functioning properly. • Check the state of all of the gauges and indicators on the electrical panel. • Clean the interior of the electrical generator. * • Check the engine manufacturer's manual for specific tasks.
EVERY 500 HRS. YEARLY	• Make sure there are no leaks in the coolant tubes. • Make sure that all of the unit's alarms display correctly. • Thoroughly clean the engine radiator. • Check the engine manufacturer's manual for specific tasks.
EVERY 1000 HRS. YEARLY	• Fully charge the battery and check the electrolyte level. • Thoroughly clean the generator unit. • Clean the control panel and tighten its connections. • Clean the electrical power panel and socket panel and tighten its connections. • Make sure the control apparatus measurements given are correct. • For units with trailer, take to specialized maintenance shop (annually). • Check the alternator manufacturer's manual for specific tasks. • Check the engine manufacturer's manual for specific tasks. • Check the condition and tightness of the antivibration feet.
EVERY 3000 HRS. EVERY 2 YRS.	• Change coolant (does not apply to the oil cooled DZR range).

Notes:
- *Check your engine and alternator manuals for specific maintenance tasks.*
- *Make sure maintenance is performed by qualified personnel.*
- *Be sure to comply with local legislation on environmental protection. Batteries, filters and used fluids as well as replaced electrical material and packaging should be taken to an authorized recycling center.*

** When cleaning the generator, do not use pressurized water as it could damage components.*

8.- TROUBLESHOOTING

INCIDENT			LIKELY CAUSE	SOLUTION
IN THE ELECTRICAL PANEL	Engine does not start	Starter does not turn.	Defective battery.	Replace the battery.
			Battery isolator open.	Close battery isolator.
			Defective starting system.	Contact technical services.
		Starter functioning properly.	Faulty voltage detector on control module.	Contact technical services.
			Lacking fuel.	Refill the fuel tank.
	Engine starts	Stops with cause.	Emergency has occurred.	Take appropriate measures.
		Stops for no apparent reason.	Emergency not indicated due to faulty LED indicator.	Contact technical services.
		Does not stop when emergency occurs.	Defective shutdown system.	Press emergency stop button.
				Contact technical services.
		Generator does not stop when in stop position.	Faulty control unit.	Press emergency stop button.
			Defective shutdown system.	Contact technical services.
ORIGINATING IN ENGINE'S INTERIOR	Unit in operation	High voltage at no load.	Excessive speed.	Contact technical services.
			Alternator failure.	
		Low voltage at no load.	Reduced speed.	Contact technical services.
			Alternator failure.	
		Correct voltage but low when on load.	High load.	Adjust the unit's loads.
			Underspeed on load.	Contact technical services.
			Alternator failure.	
		Voltage unstable.	Voltage meter damaged.	Contact technical services.
			Engine unsteady.	
		Strange noise inside the unit.	Various causes.	Make sure nothing is preventing the unit from functioning properly.
				Contact technical services.
		High alternator temperature.	Ventilation openings obstructed.	Remove obstructions from internal and external ventilation openings.
			Possible overload.	Check loads.

9.- PROTECTION FROM THE ENVIRONMENT

Once the electrical generator has been installed, it is necessary to clean the packaging, accessories, electrical tools, etc., that were used during the installation process.

When it is time to dispose of the batteries, in keeping with environmental regulations it is advisable to take them to an authorized recycling center.

For a cleaner environment, recycle all possible items and be sure to not throw electrical components in with the regular garbage so as to comply with European Directive 2002/96/EC. These items should be stored separately until being taken for ecological recycling.

10.- WARRANTY

- The electrical generator warranty covers an entire year, starting from the date it is installed. This should be communicated to GRUPOS ELECTRÓGENOS GESAN, S.A. (hereinafter “the manufacturer”), in writing, via fax or email. The following information must be included: MODEL, SERIAL NUMBER and INSTALLATION DATE.

- If the manufacturer is not informed of the installation within a maximum of sixty days from the invoice date, the latter shall be considered the effective start date of the warranty period. If for any reason the installation is not possible within the first sixty days following the invoice date, the manufacturer must be informed thereof in writing. Thus no warranty claims shall be accepted if the manufacturer does not possess the aforementioned correspondence.

- The warranty of the electrical generator will cover any faulty components or assembly not caused by improper use, handling or modification. The warranty does not cover breakdowns caused by connecting the electrical generator to devices not installed or supplied by the manufacturer. Also excluded are breakdowns and damages caused by prolonged or improper storage. In the latter case, check the manufacturer’s user manuals.

- The warranty for the electrical generator shall cover ONLY the replacement parts and labor necessary for the repair of the generator by personnel authorized by the manufacturer. Traveling, kilometers traveled and other expenses deriving from the repair of a generator under warranty are excluded from the warranty coverage and in no case shall the manufacturer be responsible for these covering these expenses, which shall be paid in cash.

- The decision to accept or reject a warranty shall be made by the manufacturer. In the case of engine and alternator breakdowns, the warranty shall be granted by the provider of said components, according to the particular warranty conditions of those components. The manufacturer reserves the option to request that the faulty element be returned. In such case, all costs related to said return shall be covered by the customer.

- The warranty for a repair made during the warranty period shall have the same expiration date as the warranty for the electrical generator.

- The warranty does not cover damage caused by terrorist attacks, natural disasters, sabotage or incidents of a similar nature

- If any of the provisions set out does not comply with the legislation of a certain country, the importer is required to notify the manufacturer thereof prior to carrying out the sale transaction.

11.- NOISE LEVEL

GESAN Electrical Generators produce different acoustic levels depending on the output and soundproofing of the electrical generator. The noise output is indicated on a sticker affixed to the unit's base frame.

Each electrical generator is provided with a sticker indicating the level of noise output produced (see APPENDIX 1 - FIGURES). The noise level has been measured according to the European Directive 2000/14/EC and in compliance with the maximum levels established by the directive 2005/88/EC.

Sales reference	Noise levels	
	LWA	dBA@7m
DPR 20	90	70
DZR 30	90	62
DZR 40	94	66
DPR 30	94	62
DPR 45	94	66
DPR 60	94	66
DPR 80	94	66
DPR 100	97	69
DVR 140	97	69
DVR 150	97	69
DVR 200	97	69
DVR 250	97	69
DVR 300	97	69
DVR 375	97	69
DVR 410	98	70
DVR 500	94	62

Note: If you work near the unit for any extended period of time, it is advisable to use hearing protection.

12.- DECLARATION OF CONFORMITY CE

GRUPOS ELECTRÓGENOS GESAN, S.A., shall deliver a CE "Declaration of conformity" form along with the unit, in compliance with the referenced regulations or standardized documents.

13.- APPENDIX 1: FIGURES

Detail of the unit's nameplate:

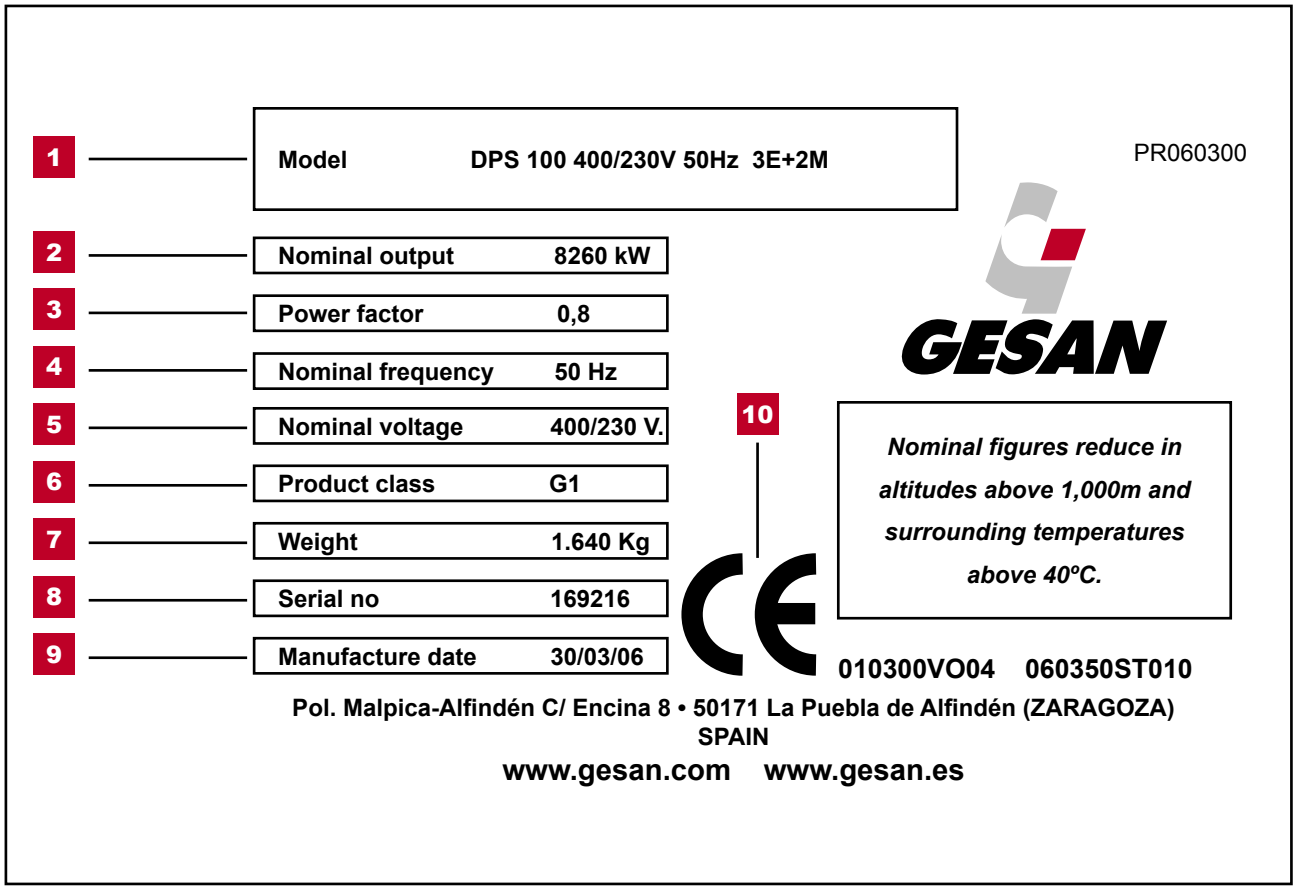


Image 15 - NAMEPLATE

Nº	LABELED ITEM	DESCRIPTION
1	DPR 100	D => Engine uses diesel fuel at 1,500 rpm.
		P => Engine manufacturer is (P)erkins, (V)olvo, (C)ummins or Deut(Z).
		R => The electrical generator is soundproofed rental series.
		100 => Commercial name.
	400/230 V	Indicates electrical generator output voltage.
	50 Hz	Indicates nominal frequency (Hertz).
	SE+ 2M	The electrical generator's control panel contains five electric gauges (Ammeter, frequency meter and voltmeter) and two mechanical gauges (Engine temperature and fuel level).
	Built-in control panel	Indicates control panel built into electrical generator.
2	Nominal power 80 kW	Nominal output of engine expressed in kW.
3	Power factor 0.8	Indicates power factor of alternator.
4	Nominal frequency 50 Hz	Nominal frequency of electrical generator (Hertz).
5	Nominal voltage 400/230 V	Nominal frequency of electrical generator (Volts).
6	Product class G1	When withstanding an overload, engine will perform according to catalogued response times per ISO 8528.
7	Weight 1,640 kg	Total weight of electrical generator.
8	Serial no. 169216	Serial number of generator manufacture.
9	Manufacture date 30/03/06	Manufacture date of electrical generator.
10	CE	CE marking indicates that electrical generator complies with the relevant standards.

IMPORTANT
PLACING IN OPERATION:
1. Make sure "Battery Isolator" switch is CLOSED.
2. Check engine's water and oil levels.
3. Connect ground wires to a suitable point on the ground.
4. Make sure electrical power circuit breaker is OPEN.
5. Connect cables to connection terminals on circuit breaker.
6. Start up ELECTRICAL GENERATOR.
7. Make sure voltage and frequency are correct.
8. Set electrical power switch to CLOSED position.

Image 16 - Placing in operation

CAUTION
THIS ELECTRICAL GENERATOR COULD START UP WITHOUT PRIOR WARNING.
To perform MAINTENANCE, switch the BATTERY ISOLATOR to the OPEN position.

Image 17 - Caution with generator startup

Image 18 - General warning

Image 19 - Undefined Warning Notice

Image 20 - Electrical Hazard 230 Volts

Image 21 - Electrical Hazard 400 Volts

Image 22 - Lifting point

Image 23 - Possible battery leakage

Image 24 - Electrical grounding

Image 25 - Noise output 90 dB

Image 26 - Noise output 114 dB

Image 27 - Use of hearing protection required

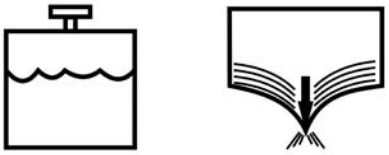


Image 28 - Coolant Flush

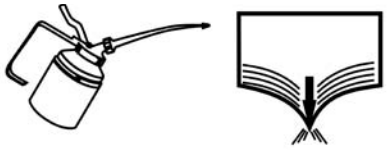


Image 29 - Oil draining

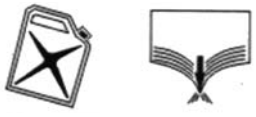


Image 30 - Fuel draining

BATTERY ISOLATOR

Image 31 - Battery isolator

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